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The Official Journal of the Rocks and Minerals Association

Chips from the Quarry

PIONEERING IN MINERAL TEACHING

Elsewhere in this issue we present an account of the mineral study program carried on at the Brooklyn Children's Museum. For a long time we have been after Mr. J. C. (Jack) Boyle to give us details of the program he has developed there for teaching mineralogy to young people, and we are happy now to present it in his own words.

We have known Jack for a number of years (he was one of our first subscribers and members) and can testify to his reticence when it comes to talking about himself; ask him about the accomplishments of "his" boys and girls and he is volubility itself, but it is a very difficult matter to get him to say anything about his part in their success.

Having visited his "Lab" during work-periods, we realize the great extent to which Jack is the confidant, guide, and inspiration of "his" boys and girls.

To say that his students have acquitted themselves very well in geological and mineralogical studies in such universities and colleges as Minnesota, Wisconsin, Syracuse, New York, C. C. N. Y., Brooklyn and others is perhaps the best testimony to the enthusiasm and vitality of his work at the Museum.

The Brooklyn Pick and Hammer Club is an outgrowth of Jack's work at the Museum. It is composed of those who have completed the course in mineralogy described in his article. The Club meets on Saturday afternoons for discussions on the uses of minerals, various geological topics and related subects. During this past winter, the members have discussed the importance of the "strategic" minerals both from military and industrial standpoints.

Th Club publishes a four-page leaflet, *Pay Dirt*, which is its official journal. In this semi-monthly are published outstanding articles written by club members, including those covering the discussions referred to above, as well as accounts of trips to localities and finds made. A number of new localities found by members in the New York area have been thus described.

We have been told a story about Jack; at the risk of criticism, it is herewith passed along to you. The head of a department in a large university invited Jack to speak at a teacher's conference on methods of instruction, and introduced him thus: "You will now hear from someone who will not tell you how it could be done; he will tell you how he has done it."

Peter Zodac

READING HILLS TOUR

A mineralogical tour through the jasper localities of Eastern Pennsylvania and conducted by Richmond E. Myers, Director of Tours, will be held on Sunday, August 25, 1940.

The tour will start at Center Square, Easton, Penna., at 9:00 a.m. D. S. T.

Those desiring to attend should register at their earliest with Mr. Myers, Dept. of Geology, Muhlenberg College, Allentown, Penna. It is suggested, for ease in identification, that members should display the Association emblem on their cars.

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THE HARDYSTON JASPER OF THE READING HILLS IN PENNSYLVANIA

By RICHMOND E. MYERS, Instructor in Geology,
Muhlenberg College, Allentown, Pa.

The Reading Hills of Pennsylvania, known to physiographers as the Reading Prong of the New England Province, enter the state from New Jersey along the Delaware River between Easton and Monroe. Stretching in a more or less westerly to southwesterly direction, these hills reach across upper Bucks and lower Northampton counties, continuing across southern Lehigh, and coming to a rather abrupt end just west of Wernersville in Berks County. Various local names have been given to them, such as Durham-Reading Hills, Lehigh Mountains, and South Mountains being the most common. They are in line with the Blue Ridge farther south, but are separated from that province by a gap of about fifty miles in width thru which the Susquehanna River takes its course southward. They lie between the Great Valley on their north, which is floored by Paleozoic sediments below the Silurian in age, and the Piedmont on their south, which is composed of Triassic sediments and intrusives. Topographically they may be described as low ridges with an average altitude of around 1000 ft., their highest summits being found in the district around Wernersville where they reach to 1300 ft. in Millcreek Township, Lebanon County. Between the ridges occasional limestone valleys intervene at infrequent and irregular intervals, the two largest of these being the Oley and Saucon Valleys. The hills are eroded to maturity, being as a rule well rounded, with only a few sharper summits. Their slopes are not too steep to prevent cultivation, and small scale farming is done in almost all of their area. The steeper slopes and highest parts are still woodland, and roads cross and recross them every few miles, so the remotest parts are quite accessible.

The rocks of the hills are ancient crystalline granitic and basic gneisses of Precambrian age, as well as some Cambrian sandstone and quartzites. The intervening valleys are floored with early Paleozoic limestones and shales.

Various mining activities have been carried on in these hills, iron having been the mineral of importance. Magnetite was mined in several localities on a large scale. The most important of these were the mines at Seisholtzville and Rittenhouse Gap in Berks County, the Vera Cruz mines in Lehigh County and the Durhan mines in Bucks County. Limonite mines were abundant. In some regions, such as the ridge between Mountainville and Emaus in Lehigh County, one finds over ten to a square mile. All of these are abandoned today, in fact no iron mine of any kind is active in the Reading Hills at the present time. But there are those who believe that some day the mining industry of this region will come into its own again. The intervening valleys have also produced their share of iron in the past, as well as zinc from the Friedensville Mines of the Saucon Valley, but it is not the purpose of this paper to trace the history of the mining industry in the Reading Hills, instead the purpose is to tell the story of one mineral, usually associated

with the iron ores of the mountains, Jasper.

Jasper can be defined and described by identifying it as one of the crytocrystalline varieties of quartz. (Dana No. 210). It is usually colored red, yellow, or brown, but may sometimes occur in various shades of green, or mixtures of the above. These colors are due to impurities, usually iron oxides. Almost always jasper occurs as a massive mineral. Chert and flint are essentially the same thing, only in both these cases the coloring is white to dark gray or black, respectively, and the color line is the chief line of demarcation between jasper and its two near relatives. Jasper could well be called yellow chert or red fiint.

Being far from rare, jasper was one of the first minerals known and used by man. His first adoption of the "red stone" was undoubtedly for ornamental purposes. Altho never classed as a precious gem, it has held its place with the nobility of the mineral kingdom. In Revelations XXI, 18-19, we note that it is placed with gold and precious jewels. Kunz believed it to have been one of the stones on the breastplate of the high priest of Israel. Several of these famous stones may have been jasper, but they may just as likely have been something else. The correct translation of the ancient Hebrew words for various gem stones is to a certain degree a dubious matter. The one stone on the breastplate described as "Odem" may have been the same as the Egyptian stone "chenem" which is known to have been jasper. The Egyptian use of the stone as set forth in the Book of the Dead, stated that an amulet of "chenem" was an essential part of the equipment of any mummy who wished to have the proper paraphernalia with which to appear before Osiris in the after-world. Amulets of jasper have been found on mummies and the similarity in sound of the two words may be taken as an indication that jasper was one of the stones in the breastplate.

Thruout the ancient world jasper was believed to have in common with all gem stones, certain mystical and therapeutic powers. Many of these ideas were carried down thru the middle ages and it may be of interest to note a few of them. The Romans believed it would stop bleeding if powdered and sprinkled into an open wound. A Florentine writer at a much later date attributed to jasper the power of rendering the wearer immune to the venom of poisonous snakes. In Turkey, jasper was considered an excellent rain-maker, altho the exact procedure by which it brought on rain is unknown. It was also used in love potions and similar charms, its red color being associated with affairs of the heart. Others stones served identical purposes, but these were as a rule too costly for the average mortal, and jasper being within the reach of the average pocketbook had a popular following.

In America, jasper was known long before the white man came to these shores. It was excellent for arrowheads as well as beads, and therefore deposits of workable jasper were eagerly hunted out and opened by the Indians. There are a number of places in the Reading Hills where the Redmen mined jasper. In fact these may be considered the first mining activities of the region if not of the state of Pennsylvania. At Vera Cruz in Lehigh County, only a short distance from the writer's home, extensive diggings were made, and the pits are easily accessible and readily seen today. Scattered in the fields around these pits one may not only pick up plenty of jasper, but also many unfinished or broken arrowheads, and at times even the stone tools that were used to work the material. Most of the actual rough work of shaping was done right at the mine, for it was easier to carry home a bag of almost finished arrowheads than pounds of massive jasper. Other Indian mines are located behind Lyon's Station in Berks County, and in the vicinity of Durham Furnace in Bucks County.

The jasper of the Reading Hills occurs in the Hardyston formation. This is

chiefly made of sandstones (frequently metamorphosed into quartzites) and conglomerates. The conglomerates occur at the bottom of the formation, and are composed of quartz pebbles which as a rule are stained a reddish purple, and cemented into a dark quartzose matrix. The sandstone members are generally arkosic, and it is in these layers that the jasper develops. A high iron content in the jasper often passes it into limonite ores of workable quality and quantity, and due to it the sandstone or its quartzite equivalent are often stained deep reds, browns, and yellows. There are some portions of the sandstone that are not arkosic, but these are exceptions. A typical specimen of the Hardyston would be an arkosic quartzite. The term quartzite has been used for the entire formation and it is usually referred to as such, but the tendency today is to recognize the separate members.

In age the Hardyston is early Cambrian, and in normal position it lies between the older crystalline rocks of the hills and the younger Tomstown limestone immediately above it. At one time it probably covered the crystalline rocks, but has been removed by erosion from the tops of the hills. Its present position is flanking the hills along their lower slopes. However in many places it can not be seen either because it has been covered over by talus, or is absent entirely thru faulting or erosion.

The jasper is common in the Hardyston of the Reading Hills. In color this Hardyston jasper varies from a taffy yellow to dark red or brown. It has a dense texture with waxy luster. Usually it is a fine grained variety, having a smooth surface and conchoidal fracture, but it grades in places into a coarse grained even sandy type with rough fracture. At several localities it occurs as a brecciated rock that has been recemented by silica, either chalcedony or quartz crystals. Again it is found covered with drusy quartz, and when the drusy is stained red is known as "bleeding jasper" by the local inhabitants.

It is not known to occur in any definite position within the Hardyston other than being associated with the iron bearing horizons of the formation. There are places where the jasper may be observed "in place", that is with a dip and strike in conformity and at times in contact on the lower slopes of the hills. Its relationship with the limonite is evident as it is to be found in practically every one of the old iron mine dumps of the region. These places have proved good collecting grounds for practical purposes, as many of the large jasper boulders have been removed by the farmers and are to be found in use as fences thruout the Reading Hills.

The origin of these jaspers has been somewhat of a controversial subject. It hinges on a difference of opinion concerning the origin of the hills themselves, and has been used to support one theory by one side, and break down the same theory by the opposition. Stose and Jonas (1) who advocate the theory of a great overthrust of several miles, which was followed by normal faulting, folding and erosion, as being responsible for the present structural relationships of the region, consider the jasper as having been formed by replacement of limestone by silica along the line of the overthrust, and further postulate limestone valleys within the mountain area from the presence of jasper where no limestone is outcropping

On the other hand, Fraser (2) believes the region to be the result of normal faulting and folding plus erosion, and holds that the jasper as a part of the Hardyston could not be a limestone replacement product, but instead is a replacement of quartz in quartzite. Microscopical examination of the jasper has shown that silica in one form (small grain)—has replaced silica of another form (larger grained). Thin sections show large quartz grains being replaced by chalcedony type silica. The common association of jasper with the Hardyston plus the evidence of the microscope, in-

1 Highlands near Reading, Penna.; an erosion remnant of a great overthrust sheet, Stose and Jonas, Bulletin of Geol. Soc. of America, Vol. 46 p. 757. 1935.

2 Contributions to the Geology of the Reading Hills, Pa., D. M. Fraser, Bulletin of the Geol. Soc. of America, Vol. 49, p. 1199, 1938.

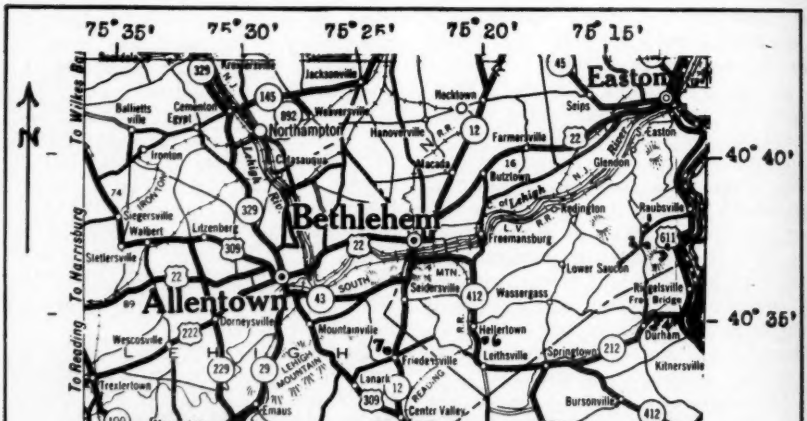
cline the writer to favor the latter opinion. It is interesting to see how the presence of the jasper has entered into one of Pennsylvania's interesting geological controversies.

The original silica was probably deposited as a hydrous gel, both as primary and secondary depositions. Silica exists in a colloidal state in natural waters, and may be precipitated in various ways. The resulting gel is high in water content, and tends to dehydrate almost as soon as formed. Crystallization goes on while the hydration is taking place, and the product may be chalcedony, or even a granular quartz. Iron impurities result in the formation of the variety called jasper. The material may shrink with the dehydration, and in shrinking, crack. Later deposition may fill the cracks resulting in the recementation so evident in several localities. The possible agents of precipitation on the floor of the Cambrian sea could easily have been electrolytes. Judging from present water conditions, ample silica could easily have been present.

* * * * * *

ITINERARY FOR A JASPER COLLECTING TOUR THRU THE READING HILLS

NOTE: The numbers in brackets refer to the quadrant divisions on the U. S. Geological Survey quadrangles of the area. These are obtainable from the Director, U. S. Geological Survey, Washington, D. C., at the nominal price of 10c each. All these quadrangles are



Map of the area around the Reading Hills of Eastern Pennsylvania

1—Deemer School
2—Jasper locality
3—Coffeetown
4—Durham Furnace
5—Durham Iron Mine
6—Bachman Iron Mine
7—Friedensville Zinc Mine
8—McCungie jasper locality
9—Corundum Mine
10—Vera Cruz jasper locality
11—Seisholtzville Iron Mine
12—Rittenhouse Gap Iron Mine

(From 1932 Road Map of New Jersey)

on the approximate scale of an inch to a mile with twenty foot contour intervals. At the time of writing, all are in stock. (Feb. 1940).

There are numerous places in the Reading Hills where jasper may be found. It is not my purpose to list all of them in this paper, but I shall attempt to describe some of the more readily accessible and better grade of jasper-bearing areas and localities. Instead of merely listing them, I have arranged those selected to fit in with an itinerary for a jasper collecting tour of the Reading Hills, starting at Easton in Northampton County, and ending in the vicinity of Reading, in Berks County. One should be able to cover this hurriedly in a day, or more carefully in two days. The route may be followed in reverse, or picked up at any point along the way.

Starting at Center Square in Easton, drive south on route 611 to Raubsville. At this point turn right (west) and follow the black top road for 1½ miles to the Deemer School. Half a mile southwest of this school, along the dotted road on the Easton Quadrangle (4-4-9) and along the 300 ft. contour which this road crosses several times, one will find large masses of jasper colored taffy yellow to brown, which has been cracked and these cracks filled with silica, frequently as quartz crystals. Many of the cracks are unfilled. The jasper which is well scattered thru the fields, seems to be residual material. A fence along the east side of the road has large blocks of the jasper scattered thru it, along with the dark banded Pochuck gneiss which is the principal rock of the hills just north and west of the area. The large summit which dominates the landscape is the Hexenkopf hill, famous in local legend as the meeting place of the witches on Walpurgis night.

Return to the Deemer School when you have collected what you wish, and then head south to Coffeetown, a distance of slightly over a mile of not too bad road (you may return all the way to Raubsville if you wish a better road and proceed south from there to Coffeetown). From this point, journey south about three miles along the river to Durham Furnace, your next jasper locality.

Durham Furnace, founded in 1727, was one of the first colonial iron furnaces, of which Pennsylvania had a goodly number. It was here that the chain was forged which was stretched across the Hudson below West Point to prevent the British from sailing up the river to the fortress. Extensive iron mining was done in this vicinity in those days, and the magnetite is still found in the old workings. Prior to the white man's digging and delving into Rattlesnake Hill and Mine Hill (the names of the two hills immediately south of the Durham Creek) the Indians had worked the Hardyston for its jasper. Their excavations may still be seen, overgrown and filled with loose field stones thrown into them by farmers who at later dates desired to dispose of the float material which is so characteristic of the flatter portions of the Reading Hills. These pits are not very productive of good jasper specimens today, for the Redmen seemed to have almost exhausted the material that they found in place, however the iron mine dumps on Mine Hill are excellent hunting grounds for good quality jasper. The mine holes and dumps are best reached by heading west at Durham Furnace on route 212, for about 2 miles to the tiny town of Durham, where you turn to the left on a dirt road that winds around in back of Mine Hill, and from which you may readily see the dumps in the woods on the line between (7-2-1 and 7-2-4) Easton Quadrangle). The Indian pits are mostly on the south side of Rattlesnake Hill, just over the crest. If you are interested in Indian relics, you will probably be disappointed, for the region has been so thoroughly picked over that little worth while material has been left, but you might be lucky to find some broken arrowheads, discarded as imperfect when made.

Return to route 212 and proceed west to Springtown, where you follow 412 to Leithsville in Northampton County, about one mile across the line. Turn

right with the road, which continues into Hellertown, but instead of following the concrete road, turn off to the northwest just beyond the church, and follow by the cemetery on the dirt road, and bearing right (east) at the next intersection about a quarter of a mile beyond the church. Park you car at the next turn of the road, which is a right-angle turn to the south, and walk along the field road to the east about a quarter of a mile. You are then at the old Bachman Iron Mine. (Allentown Quadrangle 9-1-7). Situated on a ridge about a mile south-east of Hellertown, on about the 400 ft. contour, this mine is one of the well known mineral collecting spots of Northampton County. Wavellite and Cacoxenite may still be found here if one hunts long enough. Jasper is also found in the dumps at this locality, massive red material which polishes nicely, also a mixture of chalcedony and jasper which is very attractive as showy specimens. In its day this mine produced about 15,000 tons of ore, and the excavations bear evidence of the extensive diggings. The dump is of course overgrown, but in a few places it has been broken open, and collecting is possible. In the woods adjacent to the dumps, float jasper is common.

The next locality of interest is located along the flank of South Mountain between Mountainville (now in the city limits of Allentown) and Emaus, a distance of about three to four miles south west. To reach this area from the Hellertown Mine one has several routes. The best is to cut across the Saucon Valley, and reach route 309 anywhere between Center Valley and the foot of the mountain. (Refer to Allentown Quadrangle).

Cross the mountain, traveling north. Shortly after you are over the crest and heading down hill, you will enter Allentown. The city line is plainly marked. Just below this point is Normandy St. To the east of the highway a contact of the Hardyston and Byram gneiss of the mountain may be seen. From this point, following the 600 ft. contour in a southwesterly direction, and extending along the side of the mountain to Emaus, a series of iron mines have been opened in the Hardyston along the contact or close to it. The variations of the Hardyston may be observed here, for within a short distance the coarse conglomeratic phase of the formation grades into the jasper, and here we find one of the few places where the jasper appears in position. Large blocks are also found in the woods as well as on the mine dumps, particularly behind Waldheim Park. A thorough investigation of this area is impossible on a short trip, for a day or two could be easily spent examining all the old mine holes. At the time of operation several of these mines produced considerable quantities of pyrite, and altho it is not likely that good specimens will be found on any of the overgrown dumps today, it is not beyond the realms of possibility. Good jasper however will be found in abundance, as well as other varieties of cryptocrystalline quartz, such as chalcedony, flint and chert. This area is a typical Hardyston position, as here the formation flanks the northern slope of the mountain, occurring mostly as a quartzite, with a well defined iron horizon. Needless to say it can only be traversed on foot. The car will have to be parked. Miller's map, in his report on the Allentown Quadrangle[3], would be of assistance to anyone interested in covering this area thoroughly, as each mine is indicated on it, as well as the position of the Hardyston. Descriptions of these mines are given in the accompanying text.

From here it is best to move on to the Vera Cruz localities.

The best way to reach the Vera Cruz jasper pits from Mountainville is to proceed to Emaus and here traveling west on Broad Street, pass by the pipe works, and just beyond the Thaddeus Stevens School, bear sharply to the left with road passing thru the small declivity in the hills known locally as Leibert's or Leipert's Gap. Just on the other side of this gap, you will skirt an abandoned

3 Allentown Quadrangle. By B. L. Miller, 1926. 195 pp., 15 pls., including 1 topographic and 1 geologic map, 2 figs. No. A 206 Topographic and Geologic Survey, Harrisburg, Penna.

mine immediately to the left of the road. About an eighth of a mile beyond this mine hole, park your car and climb up the hill to the right of the road. In the woodlands just below its crest you will find the jasper pits. (Slatington Quadrangle, 9-9-6). They are overgrown and unimposing. However, dig around them and in them. Root thru the woodland immediately adjacent to them. Examine the furrows in the nearby fields. Inspection will surely be rewarded. To begin with you will find jasper. Besides the usual taffy yellow material, which by this time will be quite common to you, bleeding jasper occurs here. One beautiful variety consisting of a mixture of the red and yellow varieties, intermixed with white chalcedony, and occasionally grey to black flint, is eagerly sought after by collectors who enjoy polishing their material. A good time for collecting here is immediately after spring plowing, for much material is turned up in this fashion. Again you will probably find Indian relics. This famous locality for these antiquities, altho pawed over for more than a century, is still productive. Broken arrowheads, and occassionally whole ones, are the most likely finds. These are of course made from the local jasper. Knives, beads, and even pipes have been found here along with hammers and axes of various sizes. The larger material is probably exhausted, but one can never tell. The fact that these artifacts may still be found is mute testimony to the importance that this locality had for the Redmen who worked the pits two centuries ago.

One might well end his jasper collecting here, for by this time the collector should have his bags filled with each type of jasper the Reading Hills have to offer. The old corundum deposits are only a short distance away close by Shimersville (Slatington Quadrangle 9-8-9), and these may distract you from the original object of collecting jasper, yet if you are interested you may extend your journey from Vera Cruz westward, following just below the line of the hills, thru Macungie, Albertis, and Topton, to Bower's Station. All along the ridge to your left (south) there is "jasper in them thar hills." About a mile south of Bower's Station on Flint Hill (Boyertown Quadrangle 1-1-8) one will find the largest of the Indian workings, but slim pickings. This locality has been too accessible to relic collectors and students of Indian lore. Jasper is to be had, all you want, and some of the most attractive types of the hills will be found here including chalcedony, but as far as finding anything else is concerned, your chances are poor indeed.

An interesting side trip along this route would be to turn into Seisholtzville at Longswamp, and visit the old iron mines and the now operating granite quarries at that place. (Boyertown Quadrangle 2-6-1). If you have the time, drive from here into Rittenhouse Gap (Boyertown Quadrangle 2-5-1), and explore the old magnetite workings there. In the deep cuts of these mines one may see snow and ice in summer, providing the previous winter was one with ample snow. Altho collecting here is not exactly exciting, some magnetite and graphite may be secured, and at various places along the route up from Longswamp jasper may be obtained.

The jasper of the Reading Hills is one of the most interesting minerals that occurs within their borders. It is not important commercially today, altho undoubtedly it was worth its weight in pelts in days gone by when first utilized. It is important today in other ways, as I have tried to indicate. It may hold the clue to unsolved riddles of the past. At least it holds my interest, and I hope that by means of this paper to have passed some of that interest on to others.

MINERALOGY—A NOVEL PROGRAM OF EDUCATIONAL RECREATION

By J. CLAUDIUS BOYLE, MINERALOGIST
BROOKLYN CHILDREN'S MUSEUM
BROOKLYN, NEW YORK

It was the formal choir rehearsal, held every Friday night, and the choristers in small groups talked and awaited the first notes of the processional. Jimmy, eleven years old, turned to Charlie, age the same, "My birthday is next month. My birthstone is the diamond."

"Well, my birthday's in May and my birthstone is the emerald; emeralds are worth more than diamonds."

A heated argument ensued, which was finally silenced only at the demand of the older choristers.

"All right," said Charles as a finale, "I'm going to the Museum to see Mr. Boyle; he'll settle it."

The Museum they had in mind was the Brooklyn Children's Museum, where for over ten years the author has had daily contact with many Jimmies, Charlies,—and Marys, in kindling their interest and guiding their work with minerals. That they find pleasant and profitable employment for their leisure time in this work is evidenced by the keen interest they display and the excellent progress they make in the pursuit of this science.

Not long since a school teacher brought to the Mineral Laboratory twenty-five or thirty minerals for identification. Before I could give her my attention, one of the boys in the room took over the collection and proceeded to name the minerals about as fast as he could handle them. I checked his identifications and found them ninety percent correct. The teacher was astonished, but I was not; this boy was the holder of a Special Certificate in mineralogy. This Certificate means something; to secure it, the youngster must pass a final test consisting of two parts: first, written answers to ten questions; then the identification of 65 to 70 specimens at sight. The passing mark is 85% and any holder of a certificate would feel abashed were he not able to do as well as this boy on any ordinary lot of minerals.

The work carried on by the children in the Division has been carefully planned, and is administered in such a manner as to place emphasis on training and coordinating the hand, the eye, and the mind. The work,—it should rightly be called intellectual and recreational activity,—is voluntary, and children come and go entirely at their own convenience. Since no regular classes are held, all work has been put upon an individual basis. This permits each child to adopt the speed best suited to his own requirements; the harmful effects of direct competitive effort are eliminated thereby, and the results achieved have justified the procedure used. While the gathering of factual information is the goal of the work, the methods by which this is achieved are of primary importance. Careful observation and recording is stressed; when work is found to be in error, the cause of the error is sought as the point of attack. Thus, loose habits of thought or action are eliminated and that of scientific approach is encouraged.

As you enter the Mineral Laboratory, a wordy argument may sharply claim your attention; arguments are never discouraged so long as they are orderly, but you will probably be a little surprised to hear such terms as 'cleavage', 'fracture,' or 'structure,' used with utmost familiarity by youngters ten to twelve years old. Indeed, a sense of your own bewilderment may well be felt in the presence of such erudition. But you may disregard that, for the youngsters are probably too intent to notice you; they are so used to adult vistiors to 'their' room that they will accept your presence

as a matter of fact.

"Oh", said a father, "I just came to see whether Sam was fooling me. He always says he was at the Museum. Tell me, does he come here and what does he do?" It was a pleasure to assure Mr. Martin that his boy had been working very industriously with minerals, and had acquired a good knowledge of the subject. I showed Mr. Martin just what the work consisted of—all details—and he was happy indeed to know that his son's leisure time was used to good purpose, that he need have no fear of bad company or influences. Sam is not the only boy who finds relief from the regimentation of school work in the free pursuit of leisure-time activities. Every day a number of children hasten directly from their school classes to the Mineral Laboratory in order to get the first chance to work with apparatus, or to catch up with or pass others who may be working on the same project as they.

The plan of the work I have originated and carried on is given here in some detail in order to show the methods I have found helpful in meeting the requirements of children from ten to sixteen years of age. The "Beginner's Guide," a questionnaire having reference to materials in the Minerals Exhibition Room of the Museum, provides the necessary introduction to the meaning of the most common terms used to describe minerals.

This Guide poses questions, which can be answered by referring to material in the Mineral Exhibit Room. For instance, case XI is a display of minerals illustrating the various kinds of lustre, including one designated "pearly". The questionnaire requires, that having examined this case, the beginner find and name a mineral in case III of the general exhibits which shows this type of lustre. Running down the answers to this Guide, therefore, partakes of the nature of a detective game which enlists the energy and curiosity of the beginner while increasing his special vocabulary. When the beginner shows he understands the use of the terms covered by the Guide, he acquires a card of admission to the Mineral Laboratory, and is certified to the Loan Division of the Museum as entitled to borrow loan boxes—of which, more later.

On a long table which occupies the center of the Laboratory, are trays containing groups of minerals. Each group illustrates some property, such as hardness, cleavage or fracture, to be recognized in determining minerals. Each tray, also, contains a paper which clearly explains the outstanding characteristic of each specimen. When the new-comer has had a chance to examine all these pieces of material and to understand their significance, he is given his first in a series of twenty specimens, for independent study. He is told the name of the mineral and handed a printed slip and a pencil. In the blank spaces on the slip, opposite such terms as 'color', 'lustre', and other properties, he fills in the proper descriptive terms by reference to the standards on the table. He determines the degree of hardness by scratch-testing the standards; obtains the 'streak' by powdering a bit of the mineral on a white tile, and hefts the specimen to get a general idea of its relative weight.

I then carefully examine the data submitted and compare it with the material; errors are pointed out, with suggestions that indicate the source of the error, but correct data is left to the youngster to discover. The remaining nineteen specimens (each approximately three-quarters of an inch on a side) are then given him in sequence for similar treatment. The specimens thus studied in detail, with the accompanying slips, become his property and serve as a nucleus for his private collection and as reference data in the recognition of other mineral substances. The discussions brought out in the correction of errors add many hints and suggestions of real value and interest which enable the worker later to name corectly many minerals on sight. I believe, from my experience, that no other method can do so much in so short a time to acquaint young people with the data involved in the study of minerals.

"I like this," said a little girl, "because I never knew arthimetic was so interesting. The teacher says we need more practice with decimals, too." This voluntary comment had reference to the second project, that of weighing minerals first in air and then in water, to secure their Specific Gravity. This term, seemingly formidable from a child's standpoint, is clearly explained and demonstrated and the youngster is then given the necessary apparatus and materials to do the work. Each determination of twenty is checked and suggestions given that will improve their results. The opportunity to work with such nice apparatus as a balance is one to which all the children look forward eagerly, and they work diligently for the privilege.

Following this, the practice of ore treatment is demonstrated by means of an electro-magnet. Children may choose any five of ten lots of mineral powders containing different percentages of magnetic iron ore. By weighing the samples, extracting the ore by the magnet, and weighing the ore, they arrive at a figure showing the percentage of ore content. Extracting the ore by the magnet is a process that fascinates any youngster, for it seems like play to see the ore jump for the magnet and hang in strings until the current is shut off. The fact that the ore is actually from Edison's abandoned mine in New Jersey, and that he used the same process always adds to the interest. The boys and girls in doing this project imagine themselves actually working at mine processes

The succeeding eight projects acquaint children with a wider variety of minerals by applying the knowledge gained in the first project of identification. The projects are studies of groups of minerals, all the specimens of a group having some striking characteristic in common. For instance, one group consists of all black minerals, while another consists of all minerals having a leafy structure like mica. With each group a descriptive booklet is furnished, which details the difference between the members of the group. These groups embrace the most valuable and common minerals of commerce and industry. For each group, it is the task of the youngster as an amateur detective, to run down the clues given and to ascertain the identity of the suspect. When all have been successfully 'detected', a general review set of minerals is next in order. This set is given without clues and the boy or girl must find the clues and establish the identities from previous experience.

Having completed all the work up to this point, the student may request an examination for the *Certificate of Proficiency in Field Determination of Minerals* to which I have referred. This certificate is hand-executed in water colors on good art paper. It is the work of a skilled artist and is worthy of a place of honor wherever it may be displayed.

The Mineral Study program is not confined solely to the Laboratory as two series of circulating Mineral Loan boxes are available in connection with the Laboratory work: The Beginner's Series of small boxes, each containing three specimens and a small descriptive booklet; the Large Mineral Loan boxes containing twenty specimens each, and a more detailed booklet. These loans may be borrowed for home study. They are the constant delight of parents, teachers, and children. These loans serve to emphasize the importance of minerals in the everyday affairs of life and thus supply the place of talks upon the practical uses of minerals. In this way, the child learns that of which the average layman is ignorant—the importance of mineral wealth in national and international affairs.

In addition, those who have done a certain minimum of work in the Laboratory are privileged to go with me on field trips to points of interest in the New York City area, where numerous geological phenomena may be observed, and specimens collected. That a thing so mute as a mass of rock can be made to yield vivid and interesting history is

a source of great and perpetual fascination for those who go on these Field Trips.

The records of the distant past of geology are written in the alphabet of minerals which make up the rock, and the ability to recognize and interpret this alphabet gains in interest as it increases in use. In doing this, the youthful detective and investigator realizes, in his own experience, something of the idea expressed by Sir Charle Lyell, the celebrated geologist, who wrote, "As we explore this magnificent field of inquiry, the sentiment of a great historian of our times may continually be present to our minds, that 'he who calls what has vanished back again into being, enjoys a bliss like that of creating.' "

In extension of the work which I carry on in the field of Mineralogy, I have inaugurated projects devised along similar lines, which teach the elements of reading and making topographic maps and land-surface and geologic models. Many fine maps and models have been constructed by children under sixteen, and some of them have won prizes in the Annual Children's Science Fair in New York City.

Both the form and the content of this program are the result of careful consideration of all the factors involved, and a continual testing by the measure of its appeal to the young people. The subject matter is entirely new to children of school age, as the science is not taught below college grades and therefore a method of presentation had to be evolved which would appeal to relatively very young people.

Of course, the native curiosity of children can be counted upon as a motivating force, but the interest must be sustained The subject itself is one which is perhaps invested with more difficulty than many others; in any event, it certainly has a less evident appeal than studies of insects, birds, or other living objects. As the work which the young people do is entirely voluntary, there is no compulsion nor any reason why they should engage in the activity except the dictates of their fancy. It was necessary therefore to consider methods of presentation which would excite and sustain their interest. The solution of this question was the adoption of a program that requires as much activity as possible on the part of the child. The manner in which this was achieved takes into consideration that a wholesome program must provide for development of the body as well as of the mind and thus allow for the normal activity of the child.

In order to give maximum freedom to all, the program is built upon individual effort; a factor which contributes to this phase is the irregular attendance of most of the children.

To meet all these conditions and to encourage initiative, materials and written instruction are furnished and the youngster is free to proceed with his own education. I always keep in the background ready to serve as guide or to give suggestions, but not to pour out knowledge. In doing so, I steer a middle course between the lecture method and that of free expression. The children soon learn that ready help is at hand if needed, but that they are expected to use their own ingenuity so far as possible. It will be evident that as a whole, the program aims to realize as fully as possible that idea of education as the development of the powers of the individual. In dealing with this whole program of recreational education, I have held to this ideal for the intellectual side of the activity.

The success of the program can be measured by the fact that in all seasons and in all weathers children spend anywhere from one to three hours at a time diligently at work in the laboratory. These are the same chilidren to whom a talk of fifteen minutes would be boring —to whom even educational films become tiresome in a shorter time than that they spend in the Mineral Laboratory. Problems of discipline are unknown in the laboratory.

It is the writer's belief, based on his experience in developing and carrying on this activity, that such work as this can be taken as a hint by those interested in the development of leisure-time activities as outlets for the energies of youth. Activities such as this are significant as alternatives for the type of unguided activity which too often leads to antisocial acts and attitudes, the manifestations and results of which today approach the appalling.

If achievements outside are to be considered, mention could be made of boys and girls to whom the work of the laboratory has pointed the way to developing an interesting hobby for a number now engaged in other pursuits. In one case, a boy has struck out for himself in the field of lapidary work and now finds renumerative employment for his spare time at college in the cutting of gems for the trade. Others still, are pursuing advanced studies in geology and related subjects at various colleges. Two girls have already completed their studies in this field.

Still others avail themselves of much of my spare time and theirs in pursuit of studies beyond the work of the laboratory, and some of these are seriously considering some phase of geologic work as a life pursuit. Among the younger children, not a few have carried their enthusiasm beyond the portals of the Museum by giving talks in school and at their Scout troops. One little girl of twelve who is a certificate holder, devised and arranged an exhibition of minerals and rocks for the nature room of her grade school.

From a personal standpoint, I question whether I or the young people have learned the most from the creation of this project; I am inclined to think that while I have given somewhat of myself to the work, the knowledge I have gained of the ways and thoughts of children has been a liberal education. But I do know that I am having a wonderfully good time|

A RARE DENDRITE

By DR. A. C. HAWKINS

A short distance west of Frederick, Maryland, there is a range of hills belonging to the eastern part of the Blue Ridge Province, physiographically speaking. U. S. Route 340 crosses this range on its way to Harpers Ferry. In the road cut at the top of the hill, Cambrian quartzite rock is freshly exposed. On one of the vertical joint planes at the east end of the cut, close to the road, a large dendrite is on exhibition for all to see.

The area covered by the dendritic stain is over two feet square. Its size may be judged by the pearl-handled penknife, which is 3 inches long, shown standing up below the dendrite. The dendrite itself is composed of bright yellow limonite, edged all around with a rich dark brown rim of the same mineral.

If you have ever seen a bigger or better one, then we shall have to revise our idea that it is the largest one in captivity.

Incidentally it should be mentioned that Frederick has a gold mine, located in the same range of hills, a mile south of U. S. Route 40 and only a short distance out of town. Roadside signs will direct you, although the mine is not at present in active operation. The typical rusty quartz containing pyrite, with associated green pre-Cambrian phyllite schist rock, is worth looking over.

The rare dendrite.

Limonitic (yellow) with brown borders on Cambrian quartzite.

Important Nonmetallic Mineral Industries Showed Increased Activity in 1939

Many of the nonmetallic mineral industries in the United States fared better than general business in 1939. The normal pattern, however, was much the same—hesitant or declining during the first quarter, turning upward in May, and advancing at a much accelerated pace after the outbreak of war in Europe. Increasing industrial activity brought about all-time record demand for several mineral raw materials, especially in the chemical and other process industries. Substantial gains in building projects expanded markets for cement, lime, gypsum, and aggregates.

No longer lagging behind the metal mining industries in technology, the extraction and processing of nonmetallic minerals has progressed rapidly during the last decade. Froth flotation, agglomerate tabling, electrostatic separation, in fact, all the arts of the metallurgist have been summoned to the aid of the nonmetallic mineral producer. He now enlists the services of physical as well as chemical phenomena, as exemplified in such devices as the "electric ear" to control grinding speeds, the "electric eye" to control high temperatures, and a beam of light to measure particle size.

Every year the Bureau of Mines issues a Minerals Yearbook which portrays the statistical history of the mineral industries as well as their technologic and economic progress. Although this volume is not available until mid-year or later, a general picture of the status of the industries is obtainable much earlier, and, to make available such current information the Bureau has prepared a year-end review of the nonmetallic mineral industries covering the high points of what has transpired during 1939. Information assembled from many sources outside the Bureau has been supplemented by preliminary statistics and by extensive data compiled from the Bureau's comprehensive files.

The report now available, Information Circular 7106 "Nonmetallic Mineral Industries in 1939," prepared by Paul M. Tyler and Oliver Bowles, presents an epitomized review covering the whole gamut of the nonmetalic mineral field from aggregates to vermiculite. Because of necessary condensation, much material was omitted, but that included is regarded as the most important and significant. Among the many outstanding features presented, mention may be made of our present self-sufficiency in potash, a wider employment of southern kaolins, bentonites and pyrophyllites, improved types of refractories and fertilizers, a substitute for electrical mica, and various new machines and methods for processing mineral products.

According to a recent enactment of Congress reports may be sent only upon request. Copies of this report will be sent to those asking for it as long as the supply lasts. Requests should be directed to the Bureau of Mines, Washington, D. C.

NEW FIND OF VERMICULITE IN NEW YORK CITY

By WILLAM S. NEWCOMET, M.D.

A new occurrence in New York City for vermiculite is reported by Prof. Daniel T. O'Connell, Dept. of Geology, C. C. N. Y., of New York City.

The locality is in Inwood limestone which outcrops at 204 th St. and Nagle Ave (Manhattan Island). Specimens of silvery-white vermiculite were found by M. Formato, a student, during the week of May 6, 1940, while on a field trip to the area led by Prof. O'Connell. It is believed that the vermiculite occurs along the contact of an intrusion in the limestone.

OBSERVATIONS OF SOME OLD MICROMOUNTS

When one procured a mineral specimen from an old collection, especially if the label, box or other preparation was intact, he not only had the mineral, which might be of unusual interest, from a locality that today may have been destroyed by various causes, but the detail surrounding it showed how the previous owner had worked up the specimen and the study he had given it. This is particularly true regarding specimens for the microscope.

It was my good fortune to obtain the loan of several hundred from my friend Dr. Douglas Macfarlan. These have been partly described by Dr. L. C. Wills in an article upon "The Preparation of Micro Mounts,"[1] where he also gave a short description of the men who produced these early mounts. Most of these men were microscopists rather than collectors of minerals, which explains the extreme pains taken by them to produce, what might be styled, from a technical standpoint, "handsome mounts." The time and care involved commands the greatest admiration. The preparations not only required time and effort but consummate skill as well.

The mounts were made some time between the years 1865 and 1890, and might be described as the developmental period of microscopic mineralogy. While there is some data of earlier work, it was sporadic, with no definite aim. Most of these early workers were amateurs. Few professional minerologists had developed this line of work at that time and it might be said that these pioneers have a right to the claim that they were fathers of our present day development in the field of general microscopic mineralogy and to the modern "box mount."

In books upon the microscope published about the same era, we find hundreds of pages devoted to various preparations of vegetable and animal matter but practically nothing in regard to minerals.

An interesting paragraph appears on page 313, Vol. II of *The Microscope and its Revelations*, by Carpenter, published in 1883 "The application of the Microscope to the determination of the materials of the sediments now in process of deposition on the Ocean-bottom, leads us to another great department of microscopic inquiry now being extensively prosecuted, namely, Microscopic Petrology, or the study of the Mineral materials and Physical structure of Rocks."

It is quite evident, even at that time, the microscope for the study of minerals was developing upon a new line, leading up to the present day, where it is necessary to possess considerable training to employ it.

In addition to the home work it must be remembered that when these men were alive it was not easy to procure mineral specimens. To obtain these specimens necessitated many hardships, long walks through the country, long rides by train, often a matter of days. The mineral dealer, the descriptive books of location, and journals did not exist.

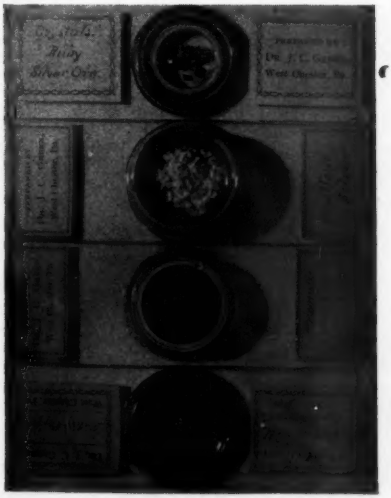
Many of the specimens in this Macfarlan collection were made by Dr. J. C. Green, of West Chester, Penna. It is understood he reached the unusual age of one hundred years. Dr. Wills has described the construction of these mounts upon the ordinary microscopic slide 1 x 3 inches, with a brass ring of varying height; a few stand as high as ½ inch, the average being ¼ inch. The width varies from ½ to ⅞ inches and black asphalt holds the mount in place. This gave the finished cell sloping sides, both inside and out. Only a small amount of paint could be applied to the metal ring at one time, allowed to dry, then repeated until the cell had its proper form. Most of these cells had the floor completely covered on the inside, which necessitated the examination of the specimen with reflected light. A few were left open for direct examination.

All this work had to be done upon a turn table, which was arranged somewhat

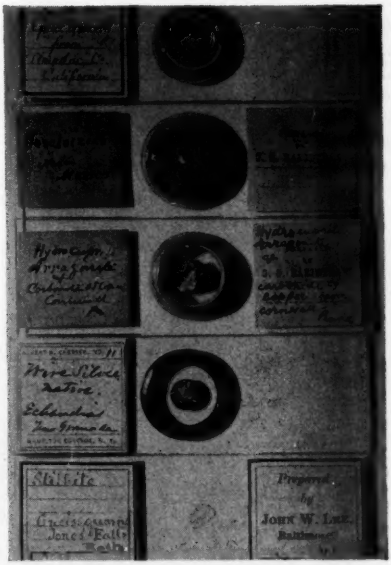
[1] **Rocks and Minerals.** Dec. 1931, pp. 149-171

like a lathe or perhaps more like a potter's wheel, where every thing had to be properly centered. The fixing material was applied with a brush. When the cell was completed the mineral was put in place and covered with a thin glass, which was secured with asphalt, or black Japan varnish. The finishing touch consisted of trimming the cell with painted rings in various colors, black, red, blue or white, the number and shade depending upon the mount. The variety of colors and the uniform gradation of the ring not only attested the skill required in the preparation of these cells but made them unusually attractive.

There were a number of mounts in this collection made by Rev. G. G. Rakestraw, most of which conformed, in general, to Dr. Green's with the asphalt base. A few were made with what appeared to be a thin green paint, which was translucent and permitted some light to pass through from below. It is difficult to explain his object. Some small quartz crystals were mounted in a red "fluid", which seeped through, making the mount useless. Red and black were the principal colors used for trimming these rather plain specimens.



Mounts made by Dr. J. C. Green showing the difference in height, which can be judged by the shadow, different colors of the rings. Notice ruby silver mount can be examined by direct illumination.



Mounts made by Rakestraw, Chester, Denison and Lee, same characteristics as Dr. Green's.

A. H. Ehrman, of Baltimore, used metal rings and a variety of colors in the trimmings. Most of the minerals were from Maryland and the Susquehanna Valley.

C. H. Denison, of San Francisco, used metal rings. Gold and the allied minerals were the principal mounts. One of his cells had a cover-glass ¼ of an inch in diameter. It is doubtful if such a glass could be obtained today.

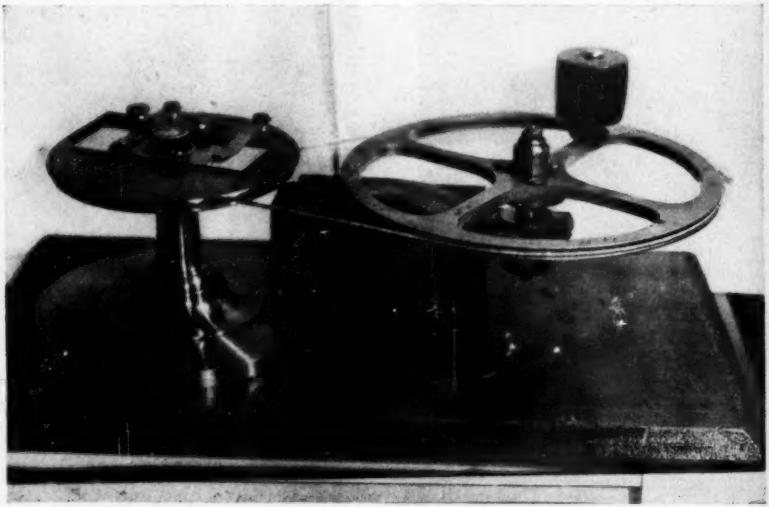
Albert H. Chester, Hamilton College, N. Y., used lead rings and finished them in red and black. Most of his cells were low, the average being about 1/16 of an inch.

There were a number of other specimens by E. H. Griffith, Freeport, N. Y., Thomas Christian of Richmond, Va., Dr. P. C. Cole of New York, C. L. Swasey, New Bedford, Mass., with a few other professionals, both from this country and abroad. In some of these later specimens vulcanite rings were used instead of a metal ring to give rigidity to the walls; but the general method of finishing remained the same. Those exhibits made by professionals in this country and abroad were usually finished in black, with decorative paper covering the unused portion of the slide.

From the similarity of these mounts, differing only in the brilliant colors, upon the walls of the cells in some, in contrast to a rather plain black or black and red in others, leads one to suppose that this rather small coterie exchanged specimens with each other. But this work failed to attract the younger element for the "Box mount" of today is much easier to produce and possesses many advantages for study, although it may not be so spectacular.

When these specimens came under observation about ten years ago they had been in storage for several decades. Although placed in cabinets that, under ordinary circumstances, might be considered dust proof, they were covered with a fine deposit of greasy dust that was difficult to remove. After disposing of the grime it was found that the majority of mounts had a deposit upon the inner side of the glass, which, in most cases, seemed to be due to a substance that had volatilized from the asphalt.

Curiously enough, small particles of the mineral were also scattered upon the under surface of the cover-glass. This condition may have been due to an elec-



Turntable used in making the cells

trical effect from rubbing the glass in an effort to clean it. However, it was more probably caused by the phenomenon that is occasionally seen when the glass is removed from old pictures and the imprint of dust has conformed to the outline of the subject below the glass. Evidently a photo electric effect. This curious dust effect will occasionally be noted in mineral cabinets, where the small particles of the disintegrating mineral, will arrange themselves along certain well defined lines. These phenomena are interesting and may only be observed under these unusual conditions.

With these specimens tightly sealed, it might be supposed they would be preserved from the ordinary disintegration often noted in our specimens when exposed. After studying these examples one might draw the opposite conclusion.

It is interesting to note that even at that early date the disintegration of certain minerals must have been observed as some were placed in certain fluids, evidently in an effort to preserve them. The character of the fluid was not given, but all were in very bad condition. A few were mounted in Canada Balsam, but they were the more stable variety.

When these mounts were loaned to me the privilege was granted of restoring those that were defective, so those that had suffered most were opened, cleaned and the cover- glass replaced and sealed. Now the curious fact is, that some of these specimens have again fogged the new cover-glass. This condition was attributed to the materials used in making these mounts, but now it may be questioned, as it is quite evident the mineral, itself, influences this change.

The mounts most damaged contained such minerals as pyrites, sulphurs and others that lose their water of crystallization; while the more stable minerals remained clear—even those mounted years ago.

It is obvious, therefore, that the fogging of the cover-glass was due to the mineral, the very same that are difficult to preserve under ordinary circumstances today.

MARYLAND MOUNTAINS TO BE STUDIED

Research into phenomena of certain mountains in Maryland will be conducted during the next three months by L. Bryant Mather, Jr., assistant curator of mineralogy at Field Museum of Natural History, Chicago ,Ill. He left Chicago Monday, June 10, to engage in an expedition in association with geologists from the Maryland Geological Survey and the Johns Hopkins University. It is expected that the expedition will yield many specimens for laboratory study and microscopic investigation, as well as for museum exhibits demonstrating important geological facts.

Intensive work will be confined to the Catoctin Mountain—South Mountain region. A thorough knowledge of the features of these mountains, and of the rocks of which they consist, is of importance to the understanding of geology of the eastern United States. In a central valley the underlying metamorphosed volcanic lavas are exposed, while the two adjacent mountain ridges are composed of very ancient sandy sediments. In addition to having been uplifted into a great overturned arch fold, the rocks of the region have been subjected to extreme pressures and high temperatures, as a result of which only the scantiest traces remain of their original structures and stratification. Secondary structures have been imposed upon them, two types of which are of especial significance: first, laminations or cleavages in directions unrelated to the original stratification; and second, the linear stretching of the mineral grains of which the rocks are composed. Field studies of these and other features will be made, using recently devised techniques.

Mr. Mather is a member of the Rocks and Minerals Association.

AN ARIZONA ROCK HUNT

By LLOYD M. DEMRICK

Did you ever hear of them? Clam Shell geodes? Well, the Arizona Rock Hounds did, thru one of their normally truthful members, so they investigated and really found them. Not honest-to-goodness petrified clams but — well, here is how it happened.

First a few words about the Rock Hounds. This pack of hounds has developed a most unusual sense of something-or-other. If a group of crystals, or any other desirable mineral, so much as dares to let itself exist in the vicinity of one of the pack, it is soon to be captured.

Whether this sense be a sort of an astral radio, or a cosmic what-not, none of the group will reveal—but they, individually and as a pack, sure smell the minerals out. Some of the members claim to be able to name the mineral doing the astral broadcasting, its distance, and other information relative to it. This may be stretching a point but whoever heard of a Rock Hound, or even an ordinary mineral collector, not getting a bit rabid at times!

Anyway, one of the Hounds reported an area containing Clam Shell geodes in large quantities, and naturally all the rest of the pack perked up their ears and twitched their noses in anticipation. But they all looked a bit dubious: Clam Shell geodes, hmmmm, "Show us."

So Sunday, January 21st, 1940, was set aside and in the chill of the early desert morning the Hounds gathered themselves together at the Arizona Museum in Phoenix, Ariz., and lit out for the clam beds mid a shrill chorus of brays, bays I mean.

The route was west on the Yuma road for fifty miles and then off the main highway to the right on the Agua Caliente Hot Springs road for about twenty miles.

An eye was kept open for a couple of Hounds that had come down the night before but they could not be found. They found the pack, tho, by its neigh—baying, dern it.

The pack swarmed over the local old Dixie mine (there are 'Dixie' mines in almost very locality) and picked up bits of copper stained ore. A barite vein showing its bare face to the world was sniffed at for a few minutes. The mine had been a stock proposition and like so many of them, the money was all put in the ground, none ever came out of it.

Several of the hounds, being a bit wiser than the others, did not rush to the old workings with the pack but headed for the old shack where the miners had lived. Usually, around old workings, the choice bits of ore are toted to the shack by the men working there and often are left when the works are abandoned. But in this case the sniffing produced only a few empty Pink Pill bottles.

The country was typical desert; foothills, level spots, little jagged peaks, and all liberally salted and peppered with cactus and mesquite.

A little beyond the Dixie mine the normally honest Hound, who was the guide, called a halt and waved his arm optimistically, "Just over this little rise," and the pack, prospectors picks in the alert position, charged over the hill.

Hmmmm, only a few tiny clams were picked up. The Hounds began to look at the guide Hound with that 'I thot so" expression.

The guide sniffed the air and looked around with no diminution of confidence, "Ah," he waved a change of direction two points to the starboard, "Just over *this* little hill are the big ones." And the pack bayed themselves over and there the findings were a bit better.

Shoulder bags began to take on weight. One youthful Hound, this was his first hunt, just figured a rock was a rock, so he picked them all up. He began to learn fast, tho, with the kindly help of the more experienced hunters, and the strictly railroad ballast in his bag began to be discarded and be replaced with the real McCoy.

After an hour or so of rather good pickings, (the geodes just lay on the surface where they had weathered out—the really good, big ones were still just 'over the next hill'), time out was called for lunch. Everybody decided to just leave them 'over the next hill' and go back to the cars and put on the nose bags. The writer had been warned to bring his lunch, and so did; a few hardboiled eggs and a peanut butter sandwich. But the others, well, they had wives and such, and the fodder they had brought! Two of the hounds had a peck or so of bananas, some bacon grease and a skillet and they fried bananas for the crowd.

The smell of the coffee, the frying bananas, the this, that, and the other thing just naturally got all the mineral-sensitive noses out of kilter and the geodes, well, they were something that could be taken up later, right now - - mmmm fried bananas and stuff.

In spite of all the succulent fodder just waiting to be consumed, only one Hound got foundered; but his nose got to twitchin' at a stray cosmic whatnot and he got up ready for the hunt again.

The next point of attack was a couple of miles further west, in the vicinity of Fourth of July Peak. Here the geodes, the honest-to-goodness Clam Shell ones, showed up in abundance. Some of them were hollow and lined with quartz crystals, some were solid with crystals and some contained banded chalcedony. The sizes ranged from an almond nut up to a Pismo clam, about four inches across. The peculiar thing is that the shape is like that of a clam, when it is closed of course. One side of the geodes feathers down to a sharp edge, the other side being nicely rounded. Looked at edgewise they had the shape of a teardrop. Flatwise they were roughly round, some were very long, tho, similar to the razor clam.

The technique of opening these clams was somewhat different from that of the real ones. We just banged on them with a hammer, or pick, and they literally fell to pieces in their haste to open. Only a few of them were broken, just enough to see what the innards were like.

Maybe some of the Hounds would be willing to trade a few of their shellfish to persons less fortunately situated for some of their superfluities.

A good deal of banded, bluish, chalcedony was also picked up, much of it suitable for cutting.

Along late in the afternoon the 19 Hounds, wives, etc. present, loaded their bushels of clams, and a bit of red jasper, too, into their cars and with handwaving they started homeward with a final lusty, happy-ending, bra - - , bay.

QUICKSILVER RESOURCES OF CALIFORNIA

State Mineralogist Walter W. Bradley announces that the October 1939 *California Journal of Mines and Geology,* of the Division of Mines, Department of Natural Resources, is just off the press and ready for distribution. This volume includes the following important papers:

Quicksilver Resources of California, by Alfred L. Ransome and John L. Kellogg (pp. 353-486). This is a timely, state-wide treatise, well illustrated with photographs, maps, and tables. It is well organized and systematically arranged, so that descriptive matter on individual properties can readily be found. In addition to more detailed data, there is a general discussion of history, economics, production, prices, uses, mineralogy, and geology. The last ten pages are devoted to a comprehensive bibliography. This report has been issued as a companion-piece to the recently released Economic Mineral Map of California No. 1—Quicksilver.

Though *Quicksilver Resources of California* is the major report in the October issue, there are also included short papers on "Sulphate Minerals of the Leviathan Sulphur Mine, Alpine County," by George L. Gary, Mineral Technologist, (pp. 488-489), and "Commercial Minerals of California," by Henry H. Symons (pp. 491-493), as well as the usual notes on Statistics, Laboratory and Library. Price 60 cents postpaid, plus 2c sales tax to residents of California.

All publications of the Division of Mines are for sale at its San Francisco, Los Angeles, and Sacramento offices.

NEW ENGLAND NOTES

Conducted by Rudolf C. B. Bartsch
36 Harrison St., Brookline, Mass.

At the May meeting of the Boston Mineral Club, Mr. Martin L. Ehrmann, of New York City, was the guest speaker. His talk on mineral collecting in Mexico, illustrated with moving pictures, was greatly enjoyed by the members.

The May field trip locality to be visited by the Club was changed at the last moment from Alstead, N. H., to those picked out by the Massachusetts group of the Rocks and Minerals Association, namely, the Dinosaur foot print locality at Smith's Ferry, Mass., and the trap rock locality at Amherst Notch, Mass. Prof. Balk of Mt. Holyoke College gave an interesting and instructive talk at the Dinosaur Ledge. The group then moved on to the trap rock quarry at Amherst Notch under the guidance of the director, Mr. John Kitson of Easthampton, Mass. At the quarry, many excellent specimens of babingtonite, calcite, datolite, epidote, feldspar, fluorite, hyalite, prehnite and stilbite were collected. The hyalite and some of the fluorite are fluorescent.

The Boston Mineral Club has announced a two day trip to Mts. Newry and Black, in Maine, on July 13th and 14th. The August trip, on the 18th, will be to Grafton, N. H. The Labor Day week end trip of three days will be to New Hampshire and Maine localities as yet not selected.

The extreme late season in New England has retarded the start of work in many of the quarries and mines. The water seeping through the ledges during the late fall and winter months freezes in solid masses on the quarry walls and in the tunnels, sometimes many feet in thickness. I have seen large ghostly stalactites and stalagmites of ice in the lower tunnels at Grafton, N. H., in late June. All this has to be removed before work can be started. Falling ice can be just as serious a problem as loose rock material. One of the best specimens of gummite and cyrtolite in my possession I found in a mass of ice which had been cast on the dump late last June.

The much publicized new operation on Beryl Mountain, at Acworth, N. H., has not commenced as yet. Much newspaper publicity on the reopening of this famous beryl locality has resulted so far in only having black lines painted around the beryl crystals visible in the quartz matrix for the benefit of the photographers. It is rather interesting to note that the feldspar workings near the foot of Beryl Mountain have as yet shown no beryls of any kind.

A locality that is always of interest is the old abandoned barite mine near Cheshire, Conn. The old dump near the road contains many fine specimens of barite, generally encrusted with drusy quartz crystals which in turn are encrusted by malachite of various forms as stains, crusts, small masses, globules and radiating crystals. Sometimes red sandstone is associated with the barite which adds to the attractiveness of the specimen. The mine pits begin about 300 feet up the road on Jinny Hill and extend for about 600 feet.

LAZARD CAHN

It is with much sorrow that we announce the death of Lazard Cahn, internationally known mineralogist, who passed away May 22, 1940, in Colorado Springs, Colorado.

Mr. Cahn, many years ago, was a dealer in minerals, speciallizing in the rarer specimens. Cahnite, a rare boroarsenate of calcium found in the zinc mines of Franklin, N. J., was named in his honor as a recognition of his untiring efforts to preserve and to make known to science the rarer Franklin minerals.

Mr. Cahn was a member of the Rocks and Minerals Association from the time of its inception in 1928.

. . Collectors' Tales . .

By PETER ZODAC

PAYING FOR A MISTAKE

Many collectors are specially interested in securing as complete a collection as possible of minerals found in certain localities, and are willing to pay good prices or to give in exchange worth while minerals from elsewhere for poorer specimens, coming from the locality in which the collector's interest centers.

A few years ago the writer was examining a mineral collection in a local school when he ran across a loose quartz crystal of no particular interest nor value. It was unlabeled and apparently of no interest even to the teacher in charge of the collection as it had been thrown to one side. For no reason at all the crystal seemed to fascinate him and he tried to ascertain in his mind its locality. It looked familiar and yet seemed stranged. Finally the thought occurred that it must be of local origin as the collection was given the school by an old resident of the city who had acquired it years ago. If of local origin it must have come from Anthony's Nose, a mountain 3 miles away, as rock crystal was reported being found there many years ago although the writer up to that time had not even seen a specimen, let alone possess one. The loose crystal in the school collection must, therefore, be from Anthony's Nose and he wished to have it.

On arriving home, he picked out 12 fine specimens, wrapped them up carefully and took them down to the teacher that very day and they were offered in exchange for the crystal. The teacher was so amazed at this one-sided offer that he wanted to give him the crystal—free—if he wanted it that bad. But he persisted with the exchange, grabbed the crystal and left—leaving behind a very dazed individual.

That night Mr. H. Alban Anderson, a personal friend of the writer and a well-known collector, called and the first thing shown him was the newly acquired crystal.

"What do you think of this specimen?" was our query, expecting to see his eyes open wide on beholding our "treasure" as he too had heard of Anthony's Nose quartz occurrence.

But his reply almost floored us. "It's a fair Ellenville crystal, isn't it?" was his calm rejoiner.

(Ellenville, 75 miles north of Peekskill, is a locality noted for its rock crystals. We have been there many times, collected many of its crystals and have seen crystals on display in all important collections. And yet the unlabeled crystal in our local school fooled us completely as we failed to recognize it.)

BIBLIOGRAPHICAL NOTES

V. D. Hill's Catalog of Mineral Specialties: V. D. Hill, the popular gem and mineral dealer of Salem, Oregon, has recently issued Catalog No. 15 which consists of 16 pages and 5 interesting illustrations. The catalog lists a large number of fine mineral specimens (crystallized, polished, etc.) and many choice gems (both rough and cut). Copies of the catalog may be obtained from V. D. Hill, Route 7, Box 188-C, Salem, Oregon.

Woodland Trail Walks with the H. T. B.: Compiled by Ernest A. Dench, Ho-ho-kus, N. J., 66 pp., price 10c. The Hiking Trips Bureau, of which Mr. Dench is director, has scheduled weekly Sunday trips through many interesting areas of the east. As some of these hikes include visits to abandoned mines, they should be of much interest to mineral collectors and especially those who like to hike.

R. & M. A. OUTING IN CALIFORNIA

E. V. VAN AMRINGE, Director

The California outing of the Rocks and Minerals Association was a most successful event. It was held on the date originally suggested, May 19th, and well advertised in the local papers and *Mineral Notes and News,* our State Federation organ. Over one hundred persons in 35 cars attended. The route was as follows:

(1) Angeles Crest Highway from LaCanada to Chilao, with discussions of the geology of the San Gabriel Mts. enroute and the collection of large feldspar phenocrysts in the porphyritic granodiorite.

(2) Rough mountain roads via Sulphur Spring, Little Rock Creek and Pleasant View Ridge to Valyermo and Rock Creek.

(3) Hike of 4 miles round trip to the Devil's Punch Bowl (Pliocene massive sandstones and conglomerates containing boulders with Eocene fossil mollusks).

(4) Pearblossom Highway along the San Andreas Rift to Bug Pines Park and Wrightwood, studying excellent fault features and collecting actinolite crystals up to 4" long and ¾" wide in the interesting schists of pre-Cambrian age.

As usual, everyone was loaded down with material, and all seemed quite happy. The weather was perfect.

R. & M. A. Outing in Connecticut

(Hartford Branch)

Mrs. Ralph F. Hills Director

The outing, held on Sun., May 12th, at the Hale quarry, Glastonbury, Conn., was a most successful one as many interesting specimens were found. Some of the minerals collected were: autunite, beryl, chalcopyrite, columbite, garnet, pyrite, pyrrhotite, torbernite and uraninite (dendritic). There were 24 in the party.

R. & M. A. Outing in Connecticut

(New Haven Branch)

Mrs. Lillian M. Otersen Director

Fifty collectors in 18 cars journeyed to the trap rock quarries of New Britain and Farmington, Conn., on Sun., May 19th, to observe the National Outing of the Association in their section of the state. Many good specimens of prehnite, datolite, calcite (dogtooth xls) and small amethyst crystals were found at the quarries.

R. & M. A. OUTING IN MASSACHUSETTS

JOHN E. KITSON, Director

WALTER NOFFKE, Assistant

Favored with good weather, the outing at the Dinosaur Ledge was a complete success. More than a hundred visitors attended the gathering which was addressed at 2:00 p. m. by Professor Robert Balk of the Mt. Holyoke College faculty; at least seventy-five of the group journeyed to the "Notch" trap rock quarry in Amherst for a mineral collecting period.

In his talk the Professor outlined the history and international reputation of the ledge among geologists of the world and then explained in an excellent manner the occurrence of the dinosaur footprints, the geology and age of the formation in which they appear. He also explained the method in which the scientists arrived at their conclusions in this matter.

At the trap rock quarry, except for two or three specimens of amethysts and some calcite with good cleavage, the picking was not good until a member of the Clark University party discovered a group of radiating thomsonite crystals. From then on the hammers and chisels were worked on an overtime basis and many good specimens were found.

The success of the outing was aided greatly by the attendance and cooperation of the Springfield Museum geology class, Boston Mineral Club, Clark University, Tufts College and the able and enthusiastic work of Assistant Director, Walter Noffke of Holyoke, who obtained the necessary permits and help from the traffic bureau of the Holyoke Police Department.

R. & M. A. OUTING IN NEW JERSEY - NEW YORK

LOUIS REAMER, Director (N. J.) **PETER ZODAC, Director (N. Y.)**

This was a joint outing of the two groups and both meeting at the Atlas limestone quarry, near Pine Island, Orange County, N. Y.

The outing was a grand success in everyway —ideal weather—hearty cooperation of Mr. Fred Babcock, Superintendent of the quarry—large number of collectors in attendance—many interesting specimens found—and no accidents. The collectors came and went and before the day was over at least one hundred had made their appearance. Of the many specimens collected, Donald Zeh, a young collector from Irvington, N. Y., displayed some of the finest molybdenite we ever saw from any locality. About 1:00 p. m., pictures were taken of some of the collectors who could be induced to gather in a group.

R. & M. A. OUTING IN RHODE ISLAND

DR. ALONZO QUINN, Director

The Rocks and Minerals Association Outing of the Rhode Island group was held at the Strickland quarry, near Portland, Conn., Sunday, May 19th. About twenty-five from Rhode Island were at the quarry and of course there were several collectors from other parts of the country, also. For those who had been there before, the collecting was not especially good, because not much quarrying has been done recently.

R. & M. A. Outing in Vermont

The Mineralogical Society of Springfield, Vt., observed National Outing Day on Sun., May 19th with a field trip to Beryl Mountain, big spar mine in Acworth, and two smaller mineral deposits, all in New Hampshire. Among the minerals found were autunite, beryl (green, blue, and yellow), columbite, feldspar, garnet (iron), gummite, mica xls, quartz (clear, rose, and smoky), uraninite, and uranophane.

VICTOR T. JOHNSON, Sec.

CLUB AND SOCIETY NOTES

Mineralogical Club of Hartford

The third field trip of the year will be held on Sunday, July 28th to the limestone quarries of East Canaan, Conn. Meeting place will be 249 High St., Hartford, Conn. Contact Mrs. R. F. Hills, 35 Manchester St., Hartford (tele. 2-1728) regarding time of departure. Bring lunch.

New Haven Mineral Club

The fourth field trip of the year will be held on Sunday, July 21st to the localities of Roxbury and Judd's Bridge, Conn. The Judd's Bridge locality is especially noted for fine blue cyanite which occurs in long blades in milky quartz. Contact Mrs. Sadie Crowley (tele. New Haven, Conn. 6-5900) regarding time and place of departure.

Ohio Gemologists Elect Officers

At the regular monthly meeting of the Northeastern Ohio Guild of the American Gem Society held Monday evening, May 20, 1940, in the Geology laboratory of the Case School of Applied Science in Cleveland the following officers were elected to head the Study Group for the ensuing year:

President, Charles Carolyne, Raymond Brenner Jewelry Co., Youngstown, Ohio; Vice-President, R. C. Hoover, Hood & Hoover, Inc., Akron, O.; Treasurer, V. E. Chittenden, W. J. Frank Co., Akron, O.; Secretary, William Theis, Webb C. Ball Co., Cleveland, Ohio.

NEW MEXICO MINERAL SOCIETY FORMED

Mineral collectors from all over the State of New Mexico met Sunday, May 19th, 1940, at the local Museum in Roswell, and formed the New Mexico Mineral Society, a Statewide organization. A resolution was passed to encourage the formation of local societies all over the State which would be affiliated with the parent society.

While rains and bad weather cut down attendance somewhat, a nice group was present, and all but four paid their dues and became members. The Society will be incorporated under the laws of New Mexico as a non-profit organization.

Officers elected were: Mr. Fred A. Miles of Roswell, President; Dr. R. E. Anderson of Lovington, Vice-President; and Dr. R. M. P. Burnet of Carlsbad, Secretary-Treasurer. The next meeting was set for June 23rd, and will be held in the Mountains, the exact location will be announced at a later date.

Mr. Miles had two large cases of Indian relics and choice mineral specimens on display, while Dr. Anderson displayed fluorescent minerals and gave a very comprehensive talk and demonstration on fluorescence, using six different types of fluorescent lamps.

There is no question, from preliminary surveys and reports, that the State of New Mexico offers the mineral collector a greater number of choice mineral and fluorescent specimens than any other locality in the world. Choice material is being reported every few days.

Member Wins First Prize at Hobby Show

At the Hobby Show held in Red Bank, N. J., on May 31, 1940, where about 150 displays were exhibited, Mrs. J. R. Algor, of Fair Haven, N. J., won First Prize with her mineral display. Mrs. Algor is a member of the Rocks and Minerals Association.

Member Exhibits Canvas at World's Fair

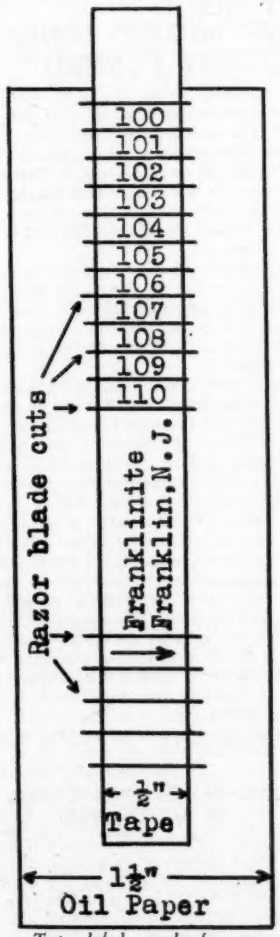
Mr. Walter Farndon, of Douglaston, L. I., N. Y., has a canvas on display in the Allied Arts Exhibit, Arts Building, at the New York City World's Fair. Mr. Farndon is a member of the National Academy and the Rocks and Minerals Association.

Collector's Kinks

Colllectors are cordially invited to submit notes from their experiences and so make this department of interest to all.

Mineral Identification Tabs

It seems to me that the adhesive tape label is the most practical one for numbering or other identification markings, but it is awkward, for me at least, to put the numbers on the tab when it is attached to the specimen, not to mention the annoyance in trying to cut the loose tape with scissors. The painted spot method* involves a two stage process, the same awkward marking, and inconvenience to "change, alter or amend." It also risks mixing of labels, particularly when handling several specimens of the same species but from different localities.



Tape labels ready for use

The accompanying sketch has a number of features which should appeal to collectors. It consists of a strip of waterproof adhesive tape attached to an oil paper. The tape may be a foot or more in length and from ½ to 2 inches in width—the oil paper must be wider than the tape and slightly shorter at the top as shown in the sketch. The tape is divided into a number of short or long strips by means of a razor blade; the cuts should extend but a short distance each side of the tape as shown in the sketch; the extra legth of tape at top is used to anchor the tape during the cutting process.

Note the following advantages of this prepared tape:

1. Takes only a few minutes to make 50 tabs to the strip.
2. Lies flat for marking and may be easily carried.
3. Easily stripped from the paper.
4. The oil paper does not injure adhesiveness.
5. May be typed or hand marked.
6. Some tabs may be colored for group or general classification or painted with fluorescent paint.
7. Arrow points for noting spots on specimens are easily cut out.
8. May be used in the field.
9. If necessary a tab may be pulled off easily from a specimen or another one placed over it.

E. H. Sarles

*The painted spot method is one where a drop of enamel is dropped on a specimen which when dry has a number or other marking inked on it.